

CAVE BEAR OPEN AIR SITE REMAINS AND DEN CAVES FROM THE UPPER PLEISTOCENE OF CENTRAL BOHEMIA (CZECH REPUBLIC)

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Abstract: A few Upper Pleistocene cave bear remains from six open air loess sites around Praha found in the 19th century and important cave bear den sites in the Bohemian Karst of the central Czech Republic are described. The few *U. cf. spelaeus* bones from the open air sites consist of cranial and postcranial bones whereas the female material dominates with 60%. The cave bear remains were found generally at Ice Age spotted hyena *C. crocuta spelaea* activity zones or den sites which are proved by strong chewing on woolly rhinoceros and other macromammal bones including some cave bear bones. The bone accumulations at many open air loess sites, especially along the Moldavian river and branching valleys, seems to be in most cases the result of hyena activity. *Crocota crocuta spelaea* used many caves in the Bohemian Karst as their den and prey deposit sites, whereas cave bear scavenging by hyenas can be proved at three horizontal cave bear den caves in the Bohemian Karst. The Upper Pleistocene fauna of the sites includes only few *M. primigenius*, but commonly *C. antiquitatis*, *B. priscus*, *M. giganteus*, *C. elaphus*, *R. tarandus*, *E. ferus przewalskii*, *E. hydruntinus*, *C. ibex*, *R. rupricapra*, *P. leo spelaea*, *C. lupus*, and sometimes *G. gulo* which indicate the influence of a mountainous and alpine macrofaunal assemblage.

Key words: Cave bears, open air sites, cave dens, Upper Pleistocene, Central Bohemia, Czech Republic.

INTRODUCTION

Thousands of large Pleistocene animal bones were found in the Bohemian Karst caves and karst depressions and around Praha at open air sites, which are only partly mentioned or figured in local Czech journals (e.g. WOLDŘICH, 1893; KAFKA, 1903; PETRBOK, 1939).

None of the publications have described or interpreted the Bohemian cave sites as hyena den or prey depot caves or have subdivided cave bear dens or hyena den caves or open air prey depot sites in former times. These old interpretations were revised recently by the new study of Upper Pleistocene hyena *Crocota crocuta spelaea* (GOLDFUSS) bone accumulations in the Czech Republic (fig. 1, DIEDRICH & ŽÁK, 2006) as a first result of a new collections management of the National Museum Praha Pleistocene bone collection.

In between many non-carnivore bones a few carnivore material of cave bears were rediscovered in the open air sites material. Only 0.1% of the open air site bones from localities around Praha (fig. 1), which have deliv-

ered more than 1.000 macromammal bones, are from cave bears.

These few cave bear bones from Central Bohemia are important for the understanding of the bone taphonomy at open air and cave sites and finally the cave bear demography and palaeoecology.

The caves which were used during the Upper Pleistocene in the Bohemian Karst and around Praha by cave bears (fig. 1) are the horizontal caves Axamitova Brána Cave at Tmaň, Turská Maštál Cave at Tetín, Nad Kačákem Cave at Hostím, and Praha Hlubočepy-Svatoprokopská Cave, whereas the few left bone remains and destruction of the locality Praha-Podolí makes it difficult to decide its history. In these caves about 500 cave bear bones are present in the collections.

In contrast to the cave bear “bone rich” caves only seven bones from six different open air sites are known. These are all loess sites around Praha at which the clay was explored for the brick works during the 19th century with the growth of the city. The six cave bear open air

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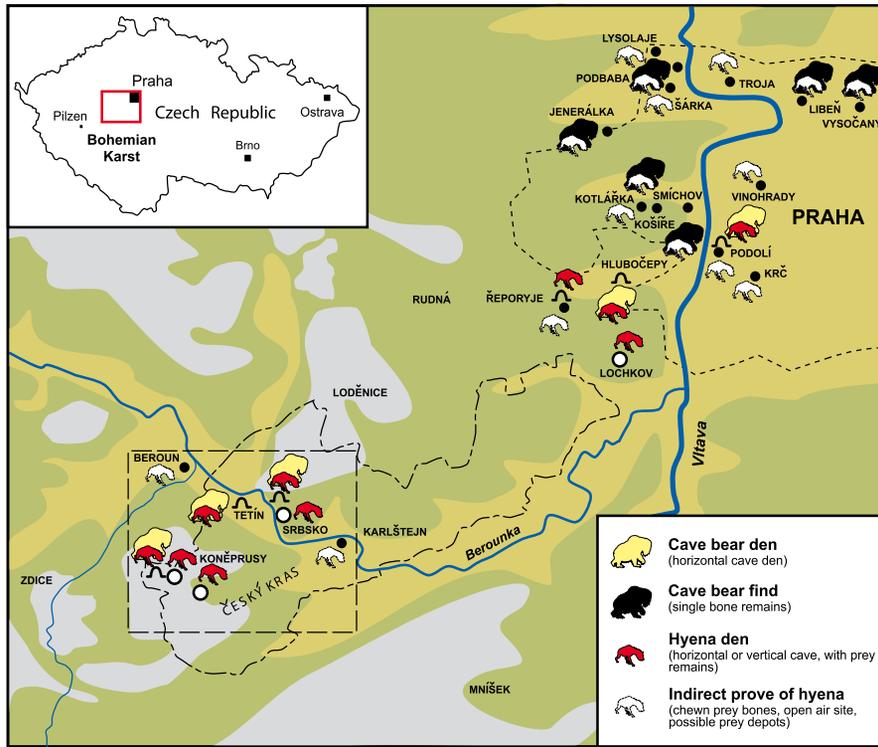


Figure 1. Geographical position of the Upper Pleistocene cave bear remains from open air loess sites around Praha (Praha-Smíchov, Praha-Jenerálka, Praha-Libeň, Praha-Podbaba, Praha-Vysočany and Praha Košíře) and important cave bear and hyena den sites in the Bohemian Karst. The cave bear remains were found at sites at which also Ice Age spotted hyena *C. crocuta spelaea* activity is proved by strong chewing on woolly rhinoceros and on some other macromammal bones. At all sites many bones of the Upper Pleistocene fauna including *M. primigenius*, *C. antiquitatis*, *B. priscus*, *E. ferus przewalskii*, *E. hemionus*, *R. tarandus*, *C. ibex*, *P. leo spelaea*, *C. lupus*, and *G. gulo* were found mainly in the 19th century (after DIEDRICH & ŽÁK 2006).

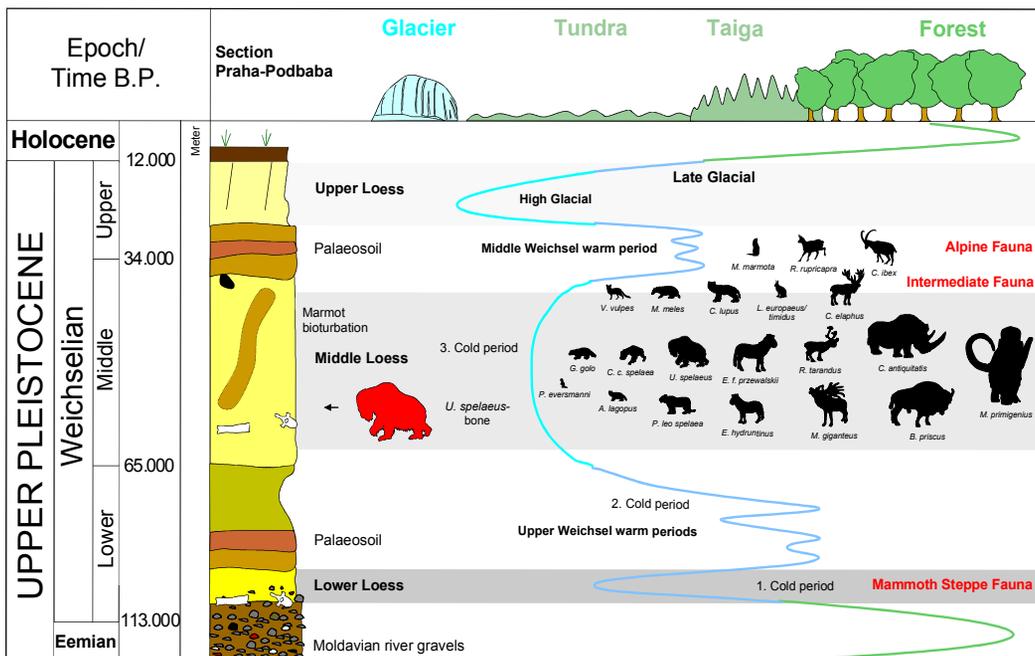


Figure 2. Geological and palaeontological history of the loess section at the Upper Pleistocene bone site Praha-Podbaba, Czech Republic (section redrawn after KAFKA (1903), with new interpretation). At this very bone rich locality by hyena chewn woolly rhinoceros bones and two cave bear bones (two ulnae, see tab. 1) were found in the 19th century.

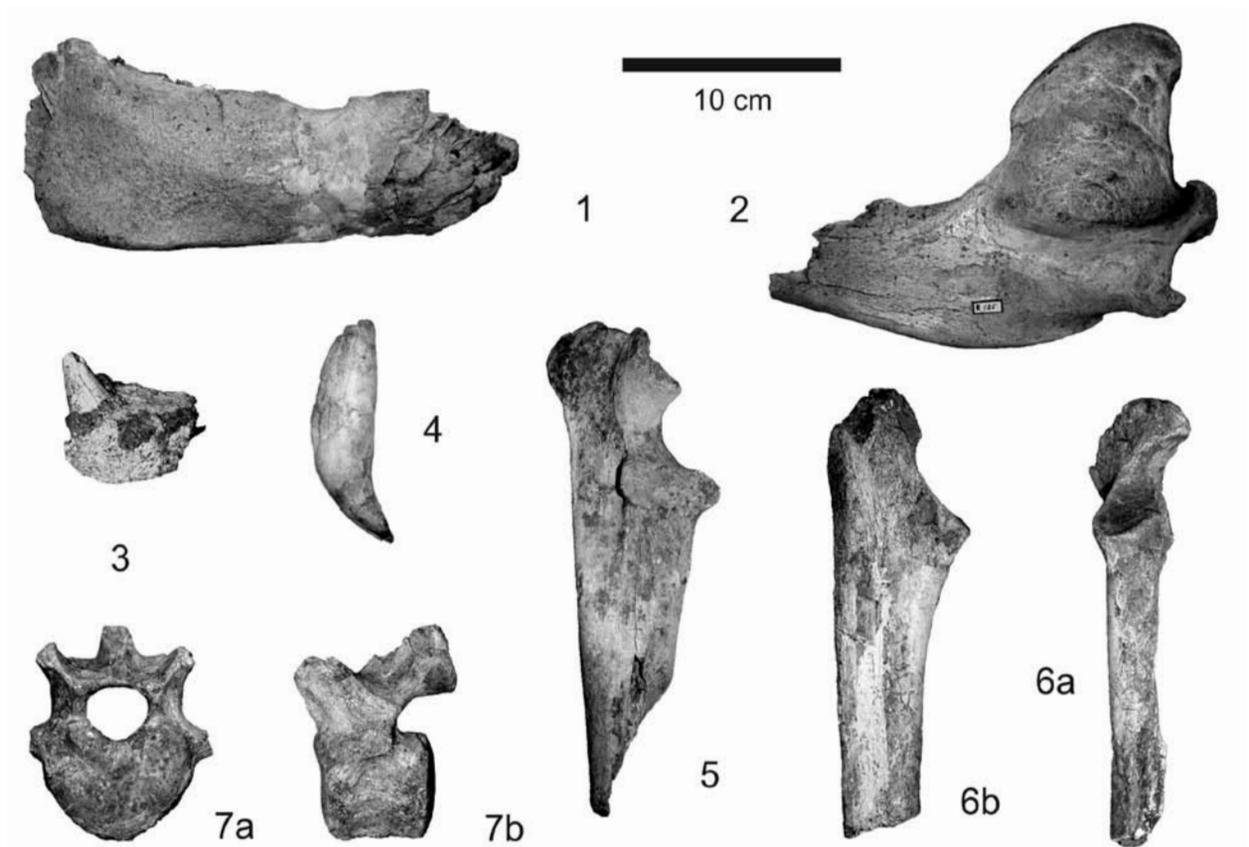


Figure 3. *Ursus cf. spelaeus*: Bone remains from Upper Pleistocene Bohemian open air sites around Praha. 1. Right mandible of an adult ?male animal from Praha-Smíchov (NMP, No. R 126), lateral. 2. Left mandible of an adult ?female animal from Praha-Libeň, Báně (NMP, No. R 125), lateral. 3. Left mandible of a juvenile animal from Praha-Jenerálka (NMP, No. R 6588), lateral. 4. Canine of an adult female from Praha-Vysočany (NMP, No. R 1312), a. lingual. 5. Right ulna of an adult male from Praha-Podbaba (NMP, No. R 78), lateral. 6. Left ulna of an adult female or juvenile male from Praha-Podbaba (NMP, No. R 78), a. lateral, b. cranial. 7. Lumbar vertebra of an adult ?male animal from Praha Košíře (NMP, No. R 6804), a. cranial, b. lateral.

localities Praha-Smíchov, Praha-Libeň, Praha-Jenerálka, Praha-Vysočany, Praha-Podbaba, Praha-Košíře are all situated along the Moldavian river and its branching valleys.

At all open air sites many other Upper Pleistocene macromammal bones of few *M. primigenius*, but commonly *C. antiquitatis*, *B. priscus*, *M. giganteus*, *C. elaphus*, *R. tarandus*, *E. ferus przewalskii*, *E. hydruntinus*, *C. ibex*, *R. rupricapra*, *P. leo spelaea*, *C. lupus*, and sometimes *G. gulo* were collected about hundred years ago. The little presence of the mammoth or giant deer seems to be a result of the mountainous situation. In this region the woolly rhinoceros and horses were quite abundant. Finally animals such as *C. ibex*, *R. rupricapra*, and *M. marmota* indicate alpine faunal influences during the Upper Pleistocene in Central Bohemia.

GEOLOGY AND DATATION

All cave bear bones are from loess clay pits around Praha and are situated on the old Moldavian river terraces. The macrofaunal assemblages and the finding situation in loess deposits above the Moldavian river gravels of the pre-Weichselian periods let them date generally only into the Weichselian of the Upper Pleistocene, whereas possibly material could range into the Saalian Ice Age.

The documented section of the open air site Praha-Podbaba is important for the geological history. It is the only of the six cave bear loess localities which was figured and described well by KAFKA (1893; 1903). This section of Podbaba, which is very similar to the Upper Pleistocene section at the hyena open air loess depot site Bad Wildungen Biedensteg in northern Germany (cf. DIEDRICH, 2006b) is redrawn here with a new and detailed geological and palaeontological interpretation (fig. 2).

Table 1
Cave bear *U. cf. spelaeus* remains from Upper Pleistocene open air loess sites around Praha (Czech Republic).

No.	Coll.-No.	Locality	Bone type	Commentary	Left	Right	Sex	Age	Bite marks	Original	Collection
1	R 126	Praha-Smíchov	Mandible	Without dentition, incomplete		x	Male	Adult		x	National Museum Praha
2	R 125	Praha-Libeň, Báně	Mandible	Without dentition, incomplete	x		Female	Adult		x	National Museum Praha
3	R 6588	Praha-Jenerálka	Mandible	Anterior fragment, with canine	x			Juvenile		x	National Museum Praha
4	R 1312	Praha-Vysočany	Dens	Canine			Female	Adult		x	National Museum Praha
5	R 77	Praha-Podbaba	Ulna	Shaft, without joints	x		Female	Adult	x	x	National Museum Praha
6	R 78	Praha-Podbaba	Ulna	Shaft, without joints		x	Male	Adult	x	x	National Museum Praha
7	R 6804	Praha-Košíře	Vertebra	Lumbar				Adult		x	National Museum Praha

The section at Podbaba starts with the river gravels of the Moldavian river which belong to the Eemian warm period. On this, thin Loess, here called "Lower Loess" was first deposited during the first cold period of the Lower Weichselian. In the "Lower Loess" a mammoth fauna was recognized with *M. primigenius*, *C. antiquitatis*, but also a *G. gulo* skeleton remain and a partial *P. leo spelaea* skeleton find were mentioned. For this part *A. saliens*, being typical for the Lower and Middle Upper Pleistocene, was figured (KAFKA, 1893). Many of the bone material was discovered in the here so-called "Middle Loess", including the two cave bear ulnae (figs. 3.5-6), which seems to represent the Middle Upper Pleistocene. Here marmot bioturbation was frequent; also burrows of other cold period micromammals (cf. KAFKA, 1893). The here subdivided "Upper Loess", which could have been accumulated at the end of the Weichselian has delivered no macrofauna at this locality.

PALAEONTOLOGY

Family: *Ursidae* GRAY, 1825

Genus: *Ursus* LINNÉ, 1758

Ursus cf. spelaeus

Material: The limited material is listed in tab. 1. Seven bones are present from six different localities around Praha: Praha-Smíchov, Praha-Libeň, Praha-Jenerálka, Praha-Vysočany, Praha-Podbaba, Praha-Košíře.

The bones are in a similar state of preservation. They are mostly grey to red-brown in colour and have in some cases rests of caliche incrustation on the surface (fig. 3.3). In many cases roots of plants have left with their roots a bizarre and non-smooth bone surface bioerosion structure by dissolution. Such preservations are very typical for loess sites and are generally absent in cave localities.

The cranial material consists of one isolated canine tooth and three mandible fragments. The first right mandible (fig. 3.1) from Praha-Smíchov has no teeth (but some roots are left in the alveoli) and lacks also the ramus. The height of the mandible (behind the M3) let the belief that this jaw is from a male individual. The second left mandible (fig. 3.2) from Praha-Libeň lacks all teeth again and is missing the anterior part. The alveoli of the last molar teeth are present. The ramus is nearly complete. In the proportions (height behind M3) the fragmented jaw fits more to a female animal. From a third left mandible of Praha-Jenerálka the anterior part is preserved with the canine (fig. 3.3). The lower height of the symphyses and the incompletely changed canine indicate a cub. The isolated canine (fig. 3.4) from an adult animal fits in its small proportions to the female canines.

Two ulnae and one lumbar vertebra are present from the postcranial. The first ulna (fig. 3.5) from Praha-Podbaba is lacking both joints. The shaft seemed to be cracked, whereas the proximal parts might be chewn off.

In particular the width of the shaft fits to male cave bears. The second incomplete ulna (fig. 3.6) from Praha-Podbaba is also lacking both joints, whereas the distal part must have been lost in modern times. The proximal part has again chewing marks. The less narrower width could fit to female bones, but possibly this incomplete bone belongs to a juvenile *U. cf. spelaeus*. Finally a lumbar vertebra (fig. 3.7) was found in Praha-Košíře which is from an adult cave bear.

The cave bear remains figured here (fig. 3) are deposited in the Pleistocene collection of the National Museum Praha (Abbreviation = NMP). The open air site bones were compared to complete bones of the famous Upper Pleistocene cave bear den site "Sloup Cave" in Moravia, from which material is deposited in the National Museum Praha.

DISCUSSION

Upper Pleistocene bone accumulations in caves of the Bohemian Karst, Czech Republic, are classified as several types of hyena dens or bone deposits and cave bear dens (fig. 1, DIEDRICH & ŽÁK, 2006).

The bone material of at least several tens of thousands of bones of this region, including about 1.000 Upper Pleistocene hyena and about 500 cave bear bone remains, is at most sites strongly fragmented by bone cracking, chewing or nibbling, very typical of hyena activities, or by improper excavations.

The cave localities can be subdivided to horizontal caves and vertical caves and karst depressions, which each have similar yet different mechanisms of bone accumulations. With the comparison of hyena cave den sites bone accumulations at open air loess sites, around Praha and the Bohemian Karst seem to be in many cases the result of hyena activity, in which also cave bear remains occur.

In the Upper Pleistocene many caves in the Bohemian Karst were used by hyenas of *Crocota crocuta spelaea* as den and prey storages but also in some cases by cave bears for hibernating, especially along the Berounka River and the branching valleys (fig. 1). Upper Pleistocene cave bears were scavenged postmortally by the Ice Age spotted hyena in three cave sites: Axamitova Brána Cave near Tmaň, Nad Kačákem Cave near Hostím and Turská Maštal at Tetín. The intensive cave bear scavenging by hyenas in three Bohemian Karst caves is documented here additionally to some northern German Sauerland caves (e.g. Perick caves, DIEDRICH, 2005b).

The cave bear open air sites along the Moldavian river and their branching valleys are loess deposit and possibly

hyena bone accumulation sites. The presence of chewing marks on woolly rhinoceros and other bones led to the belief they were of hyena prey deposit origin. A comparative situation can be found close to the cave rich mountainous area in northern Germany where freeland sites were partly studied in the Münster Bay, a flatland region north of the Sauerland cave rich mountains. Here thousands of bones were found in gravel pits at different localities mostly from the Upper Pleistocene (Weichselian). At two famous Upper Pleistocene sites Herten-Stuckenbusch and Selm-Ternsche it became obvious, that hyenas were partly or mainly responsible for big bone accumulations along rivers, in that case the Lippe and Emscher rivers (DIEDRICH, 2005a). Besides hyena skeleton remains many prey bones are similar "badly" preserved such as the bones found in the open air sites around Praha. Especially the strongly chewed and nibbled woolly rhinoceros bones are markers to identify hyena scavenging or den sites, which were later proved at the hyena open air loess site Bad Wildungen-Biedensteg in northern Germany (DIEDRICH, 2006b). Also in the Berounka valley such chewed woolly rhinoceros bones were observed in Beroun, but also at some places along the Moldavian River around Praha, which prove hyenas indirectly (fig. 1).

As for freeland sites it is difficult to discuss the male-female percentages, but the material from the females are more dominant (60% females, 40% males) at the Bohemian sites. The same cave bear sex ratio is described for open air sites in Westphalia in northern Germany (DIEDRICH, 2004; 2005a). At the open air hyena prey deposit site Bad Wildungen-Biedensteg (DIEDRICH, 2006a) all cave bear remains seems to be of female origin. More and more open air finds indicate a higher percentage of female carcasses outside the caves, whereas in caves more bones of males were found, but this can be proved only though a much higher amount of open air site bone remains in future. Also the amount of juveniles is much less in open air sites, then in caves. At the Praha sites only one jaw belongs to a few months old cub. The other bones seem to be from adult animals. Also at the German open air sites only bones from adult bears were found (DIEDRICH, 2005a; 2006a).

Acknowledgements: First I thank the head V. CÍLEK of the Academy of Science (Institute of Geology) for historical information about J. PETRBOK. The localities Koněprusy-Prošek Dome and surrounding caves, the Dědkova Díra and present-day Petrbockova Sluj Cave were visited with the permission of A. KOMAŠKO. Access to the collection and loaning of bone material from the Museum of the Bohemian Karst Beroun was possible by the support of I. JANČAŘÍKOVÁ and the head of

the Natural History Museum Praha J. LITOCHEB. The head of the Department of Palaeontology K. ZAGORŠEK supported the difficult work in the historically collected and large Pleistocene collection. The Speleological Club Praha, especially K. RYŠÁNEK, made cave trips at Srbsko-Chlum possible. Finally K. ŽÁK gave thankfully much information on the Bohemian Caves.

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